

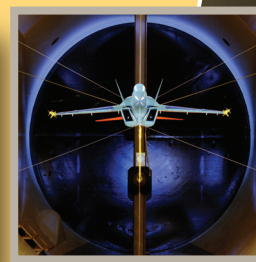
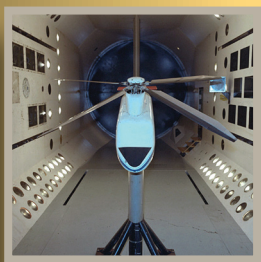
*Langley Research Center's*

# *Transonic Dynamics Tunnel*

The Transonic Dynamics Tunnel (TDT) is a closed-circuit, continuous-flow, variable-pressure wind tunnel dedicated to identifying, understanding, and solving aeroelasticity issues confronting fixed-wing aircraft and helicopter and tiltrotor configurations. Rotary-wing tests at the TDT have investigated performance, loads, and stability characteristics, while fixed-wing buffet and divergence have been scrutinized as well.

Researchers have also used the TDT to determine the effects of ground-wind loads on launch vehicles and to provide steady and unsteady aerodynamic pressure data to support computational fluid dynamics code development and validation.

Particularly useful for flutter tests is a group of four bypass valves that connect the TDT test section area to the opposite leg of the wind tunnel circuit downstream of the fan motor. In event of model instability, these quick-actuating valves open, causing a rapid reduction in the test section Mach number and dynamic pressure that serves to potentially stabilize the model.



## Facility Benefits

- The TDT features improved model-to-full-scale similitude, with easier fabrication of scaled models
- Tunnel power requirements are reduced and in the case of rotary-wing models, there are reduced model-power requirements as well
- There is excellent model visibility from the tunnel control room, with safety screens that protect the tunnel fan blades from debris in case of a model failure

## Characteristics

Test section dimensions	16 ft high by 16 ft wide by 8 ft long (4.87 m high by 4.87 m wide by 2.43 m long)
Speed	Up to Mach 1.12 (106 m/s)
Reynolds number	3.0 to $10.0 \times 10^6$ per ft
Test gas	Air or R-134-a
Drive power	30 000 hp (8.95 MW)

## Facility Applications

- Studies have been conducted at the TDT by the aircraft industry, NASA, Department of Defense, and an array of universities

## Instrumentation

Strain gauge balances	Six-component internal
Available corrections	Interactions Temperature effects Attitude tares Axes orientation Pressure tares Momentum (flow) tares

## Contact Information

<http://www.aeronautics.nasa.gov/atp/index.html>

**Jose A. Rivera**

NASA Langley Research Center

Phone: 757-864-1270

E-mail: [wte+fm\\_tdt@nasa.gov](mailto:wte+fm_tdt@nasa.gov)